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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/725,403	12/03/2003	Tomio Nakayama	03599.000083	4998

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EXAMINER	
DHINGRA, RAKESH KUMAR	
ART UNIT	PAPER NUMBER
1763	

DATE MAILED: 03/21/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/725,403	NAKAYAMA ET AL.	
	Examiner	Art Unit	
	Rakesh K. Dhingra	1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *03* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 January 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-16* is/are pending in the application.

4a) Of the above claim(s) *16* is/are withdrawn from consideration.

5)☐ Claim(s) *9 and 15* is/are allowed.

6)☒ Claim(s) *1-8 and 10-14* is/are rejected.

7)☒ Claim(s) *13* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *03 December 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *12/03, 12/05*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

Applicant's election without traverse of invention of group I (apparatus) and species B in the reply filed on 01/17/06 is acknowledged. Claim 16 is withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Applicant's argument regarding claims 1-15 reading on the elected species B has been found persuasive. Accordingly claims 1-15 have been examined as explained below.

Specification

The disclosure is objected to because of the following informalities:

1) Page 10, line 18 – the words "faster part" do not appear to be correct.

2) Page 10, line 25 – the sentence " Since the ----------of the microwaves" may please be verified for correctness especially "is several millimeters".

3) Page 16, line 13 - reads "arranges the heat conductive medium --------- in the coolant channel 11". It is suggested to replace "arranges" with "comprises" to make it more clear.

Appropriate correction is required.

Claim Objections

Claim 13 is objected to because of the following informalities:

Line 2 – "quarts" may please be corrected to "quartz".

Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

1) Claim 8 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention as explained below.

Claim 8 recites "cooling channel arranges a heat conductive medium" where "arranges" is not definite. For the purpose of examination on merits this limitation has been interpreted as "comprises" instead of "arranges". (please see remarks given above under "Specification".

2) Claim 9 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention as explained below.

Claim 9 recites "heat conductive medium is arranged around said dielectric" which is not in line with specification (page 16, lines 12-19). For the purpose of examination on merits this limitation has been interpreted as "heat conductive medium is arranged on the surface of said dielectric, around a peripheral portion of said dielectric".

3) Claim 14 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention as explained below.

Claim 14, second paragraph recites "a partition formed on said waveguide between the place of said waveguide and a microwave source" where "between the place of said waveguide" is not definite. For the purpose of examination on merits this limitation has been interpreted as "a partition formed on said waveguide between a microwave supply unit and a microwave source".

4) Claim 15 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention as explained below.

Claim 15 recites the limitation "according to claim 3" in line 2. There is insufficient antecedent basis for this limitation in the claim. For the purpose of examination on merits this limitation has been interpreted as "according to claim 14".

Further, Claims 9, 10, 11 and 15 are also rejected being dependent on above claims.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

Claims 1-4, 13 are rejected under 35 U.S.C. 102(a) as being anticipated by Yamazaki et al (US Patent No. 6,059,922).

Regarding Claims 1, 13: Yamazaki et al teach a microwave plasma apparatus (Figure 1) that comprises:

a vacuum chamber 20 that accommodates a wafer (object) 38 to be processed, and provides a plasma process to the object in a vacuum or reduced pressure environment;

a dielectric window 22 (made of quartz) for transmitting microwaves to said vacuum chamber and for maintaining the vacuum or reduced environment of the vacuum chamber;

a top plate 23 that has guide port (slot) 30 {Figure 3} for guiding the microwaves to the dielectric; and

a coolant supply system (temperature control mechanism) that has a gap (cooling channel) between said plate 23 and said dielectric 23 and controls temperature of the dielectric by increasing the flow velocity of coolant and by reducing the gap between plate 23 and dielectric 22 (Column 7, line 1 to column 9, line 10).

Regarding Claim 2: Yamazaki et al teach that a predetermined gap is maintained between top plate 23 and dielectric plate 22. Yamazaki et al further teach dielectric window 22 can be efficiently cooled by controlling the gap between top plate and dielectric window (Column 9, lines 1-3).

Regarding Claims 3, 4: Yamazaki et al teach that the cooling channel is supplied with air (coolant) [Column 8, lines 30-68].

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to

consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 5, 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamazaki et al (US Patent No. 6,059,922) in view of Hongo et al (US Patent No. 6,729,261).

Regarding Claim 5: Yamazaki et al teach all limitations of the claim except that coolant includes gas, liquid, or a low dielectric loss material.

Hongo teaches a microwave plasma apparatus (Figure 1) that includes an insulating plate (dielectric window) 72 and a plate antenna 76 and where dielectric window 72 is cooled using cooling water (liquid), fluorinet (gas) [Column 8, lines 25-32].

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use cooling water (liquid) as a coolant as taught by Hongo in the apparatus of Yamazaki et al to maintain dielectric window at constant temperature and improve repeatability and planar uniformity of plasma process [Column 8, lines 25-35].

Regarding Claim 12: Hongo teaches that planar antenna member (plate) 76 is made of aluminum (Column 5, lines 45-50).

Claims 6, 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamazaki et al (US Patent No. 6,059,922) in view of Hongoh (US Patent No. 6,736,930).

Regarding Claim 6: Yamazaki et al teach all limitations of the claim including that flow rate of coolant is adjusted depending upon process conditions [Column 8, lines 65-68].

Yamazaki et al do not teach that cooling channel is inexhaustibly supplied with coolant.

Hongoh teaches a microwave plasma apparatus (Figure 1) that includes a first temperature control device 30 for controlling temperature of antenna accommodating member 20 and adjacent parts. Hongoh further teaches that a similar third temperature control device 95 (Figure 4) controls temperature of dielectric member 28. Hongoh also teaches that coolant supply is stopped (exhaustibly supplied) till the desired temperature is attained [Column 5, lines 40-50 and Column 7, line 10 to Column 8, line 25].

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to inexhaustibly supply coolant to cooling channel as taught by Hongoh in the apparatus of Yamazaki et al to maintain desired temperature control of dielectric plate.

Regarding Claim 7: Hongoh teach that temperature control device 30/95 (Figures 1,3,4) comprises temperature sensor (detector) 36 for measuring the temperature of or near said dielectric and a control unit (controller) 31 for controlling a flow rate of coolant based on the temperature detected by said temperature detector, the coolant being supplied to the cooling channel (Column 7, line 10 to Column 8, line 25).

Claims 8, 10, 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamazaki et al (US Patent No. 6,059,922) in view of Ota (US PGPUB No. 2002/0193034).

Regarding Claims 8, 10, 11: Yamazaki et al teach all limitations of the claim except cooling channel comprises a heat conductive medium.

Ota teaches a substrate processing apparatus (Figure 1) that includes a vacuum container 12, a substrate 10 that is heated via a heat conductive member (medium) 41. Ota further teaches heat conduction member 41 comprises of silicon oil and that it can

function as a cooling or heating means to transfer heat. Ota also teaches that heat conductive material can also comprise alumina (a high dielectric loss material) and can be used in any shape like sheet, cylindrical, spherical, etc. (Paragraphs 0049 – 0054, 0056, 0057).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use a heat conductive medium as cooling means as taught by Ota in the apparatus of Yamazaki et al to maintain quick and desired temperature control of dielectric plate to achieve uniformity in the processed articles (Paragraph 0053).

Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yamazaki et al (US Patent No. 6,059,922) in view of Tanaka et al (JP Pub. No. 2-302507).

Regarding Claim 5: Yamazaki et al teach all limitations of the claim including that waveguide 24 has a gas exhausting portion (hole) 27 for exhausting coolant. Yamazaki et al do not teach said waveguide forming plural holes in place which allow the coolant to pass through the holes and prevent the microwaves from transmitting through the holes, a partition, formed on said waveguide between the place of said waveguide and a microwave source supplying the microwaves, for preventing the coolant from moving along said waveguide to the microwave source.

Regarding plural (includes duplicate) holes courts have ruled (Case law):

"Duplication of parts was held to have been obvious. *St. Regis Paper Co. v. Beemis Co. Inc.* 193 USPQ 8, 11 (1977); *In re Harza* 124 USPQ 378 (CCPA 1960)."

Also, coolant exhausting holes in the waveguide would be inherently sized to prevent microwaves from escaping.

Further regarding partition, Tanaka et al teach a plasma apparatus (Figures 1, 2) that includes a waveguide 7 having a partition 8 that permits microwaves to pass through but prevents gas or air (like a coolant) to pass through it (Abstract).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to a partition in the waveguide as taught by Tanaka et al in the apparatus of Yamazaki et al to prevent gas leakage from reaching the microwave source (Abstract).

Allowable Subject Matter

Claims 9, 15 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

Regarding Claim 9: This claim is considered as allowable subject matter due to its limitation " wherein the heat conductive medium is arranged above said dielectric" being novel and patentable.

Regarding Claim 15: This claim is considered as allowable subject matter due to material of partition as a high dielectric loss material being novel and patentable.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rakesh K. Dhingra whose telephone number is (571)-272-5959. The examiner can normally be reached on 8:30 -6:00 (Monday - Friday).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571)-272-1435. The fax phone

number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Rakesh Dhingra

Parviz Hassanzadeh
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Art Unit 1763